STATEMENT

I, Yuki SATO of c/o NGB Corporation, Toranomon East Building, 7-13, Nishi-Shimbashi 1-chome, Minato-ku, Tokyo 105-8408, Japan, hereby state that I am conversant with both the English and Japanese languages and certify to the best of my knowledge and belief that the attached is a true and correct English translation of Japanese Patent Application No.2002-248740 filed on August 28, 2002.

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PATENT OFFICE

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This is to certify that the annexed is a true copy of the following application as filed with this office.

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[Title of the Invention]

IMAGE FORMING SYSTEM AND IMAGE FORMING METHOD

[Claims]

[Claim 1]

An image forming system comprising an image display member on which an image is displayed; and an image forming apparatus; wherein:

the image display member includes:

a first parameter storage apparatus that stores a first parameter the first parameter indicating a way to form the displayed image and a history of the displayed image, or indicating any one of the way and the history, providing the stored first parameter to an external;

the image forming apparatus forms an image on an image forming member to which the image is to be formed; and

the image forming apparatus includes:

image reading means for reading the displayed image;

parameter reading means for reading the output first parameter; and

image forming means for forming the read image on the basis of the read first parameter on the image forming member.

[Claim 2]

The image forming system as claimed in claim 1, wherein:

the image forming member includes:

a second parameter storage apparatus for storing the parameter written from the external, and outputting the stored parameter to the external; and

the image forming apparatus further includes:

parameter writing means for writing one of the read first parameter and a second parameter into the second parameter storage apparatus, the second parameter containing a history which has been updated in response to the image formation on the image forming member.

[Claim 3]

An image forming apparatus for forming an image displayed on an image display member to an image forming member to which the image is to be formed; wherein:

the image display member stores a first parameter, and outputs the stored first parameter to an external unit, the first parameter indicating a way to form the displayed image and a history of the displayed image, or any one of the way and the history; and also,

the image forming apparatus includes:

image reading means for reading the displayed image;

parameter reading means for reading the output first parameter; and

image forming means for forming the read image on

the basis of the read first parameter on the image forming member.

[Claim 4]

The image forming apparatus as claimed in claim 3 wherein:

the image forming member includes:

a second parameter storage apparatus for storing the parameter written from the external, and outputting the stored parameter to the external; and

the image forming apparatus further includes:

parameter writing means for writing one of the read first parameter and a second parameter into the image forming member, the second parameter containing a history which has been updated in response to the image formation on the image forming member.

[Claim 5]

The image forming apparatus as claimed in claim 4, or claim 5 wherein:

the first parameter includes at least information indicating a mode of an image formation on the image forming member, a size of the formed image, and number of the image formation.

[Claim 6]

The image forming apparatus as claimed in claim 4 wherein:

the history contained in the second parameter includes at least information a size change of the image

formed on the image forming member.

[Claim 7]

An image forming method for forming an image displayed on an image display member on an image forming member to which the image is to be formed, wherein:

the image display member stores a first parameter, and outputs the stored first parameter to an external, the first parameter indicating a way to form the displayed image and a history of the displayed image, or indicating any one of the way and the history; and

the image forming method comprises:

reading the displayed image;

reading the first parameter output from the image display member; and

forming the read image based upon the read first parameter on the image forming member.

[Claim 8]

The image forming method as claimed in claim 7 wherein:

the image forming member stores the first parameter written from the external, and outputs the stored first parameter to the external; and

the image forming method further comprises:

writing one of the read first parameter and a second parameter into the image forming member, the second parameter including a history which has been updated in response to the image formation on the image forming

member.

[Claim 9]

In a computer program executed by a computer employed in an image forming apparatus for forming an image displayed on an image display member, the image display member storing a first parameter, and outputting the stored first parameter an external unit, the first parameter indicating a way to form the displayed image and a history of the displayed image, or indicating any one of the way and the history;

the program causing the computer to execute:

a step for reading the displayed image;

a step for reading the output first parameter; and

a step for forming the read image based upon the read first parameter on the image forming member.

[Claim 10]

A computer program as claimed in claim 9 wherein:

the image forming member stores the parameter written from the external, and outputs the stored parameter to the external; and

the program causes the computer to further execute:

a step in which one of the read first parameter and a second parameter is written into the image forming member, the second parameter including a history which has been updated in response to the image formation on the image forming member.

[Detailed Description of the Invention]

[0001]

[Technical field to which the Invention belongs]

The present invention is related to an image forming system and an image forming method, capable of setting a parameter required to form an image with employment of a non-contact memory attached to an original paper and/or a printing paper.

[0002]

[Prior Art]

For instance, the publication "MYCOM PC WEB, NEWS HEADLINE. (July 5, 2002; http://pc web.mycom.co.jp/news/2001/07/22.html)" (publication 1) discloses a compact semiconductor chip (μ-chip) from which stored data can be read in a non-contact manner from an external unit.

Also, "Japanese Laid-open Patent Application No.2001-229199 (publication 2)", "Japanese Laid-open Patent Application No.2000-285203) (publication 3)", "Japanese Laid-open Patent Application No.2001-134672 (publication 4)", "Japanese Laid-open Patent Application No.2001-283011 (publication 5)", "Japanese Laid-open Patent Application No.2001-148000 (publication 6)", and "Japanese Laid-open Patent Application No.2001-260580 (publication 7)" disclose application examples of the above-explained semiconductor chip.

[0003]

[Problem to be solved by the Invention]

The present invention has been made based upon the above-explained technical background, and therefore, has an object to provide an image forming system and an image forming method, by which while setting information (parameter etc.) of image forming operation is stored into an original paper, an image forming operation can be carried out by employing the setting information of the image forming operation stored in the original paper by utilizing a semiconductor chip from which data stored thereinto can be read out in a non-contact manner.

Also, another object of the present invention is to provide an image forming system and an image forming method, in which while setting information and a history of image forming operation are also stored into a printing paper, such an image formed on the printing paper can be furthermore utilized in the image forming operation.

[0004]

[Means for solving problem]

To achieve the above-described objects, an image forming system, according to the present invention, includes an image display member on which an image is displayed; and an image forming apparatus. The image display member includes: a first parameter storage apparatus that stores a first parameter the first parameter indicating a way to form the displayed image and a history of the displayed image, or indicating any

one of the way and the history, providing the stored first parameter to an external. The image forming apparatus forms an image on an image forming member to which the image is to be formed; and the image forming apparatus includes: image reading means for reading the displayed image; parameter reading means for reading the output first parameter; and image forming means for forming the read image on the basis of the read first parameter on the image forming member.

[0005]

Preferably, the image forming member includes: a second parameter storage apparatus for storing the parameter written from the external, and outputting the stored parameter to the external; and the image forming apparatus further includes: parameter writing means for writing one of the read first parameter and a second parameter into the second parameter storage apparatus, the second parameter containing a history which has been updated in response to the image formation on the image forming member.

[0006]

Also, an image forming apparatus, according to the present invention, for forming an image displayed on an image display member to an image forming member to which the image is to be formed; in which the image display member stores a first parameter, and outputs the stored first parameter to an external unit, the first parameter

indicating a way to form the displayed image and a history of the displayed image, or any one of the way and the history, includes: image reading means for reading the displayed image; parameter reading means for reading the output first parameter; and image forming means for forming the read image on the basis of the read first parameter on the image forming member.

[0007]

Preferably, the image forming member includes: a second parameter storage apparatus for storing the parameter written from the external, and outputting the stored parameter to the external; and the image forming apparatus further includes: parameter writing means for writing one of the read first parameter and a second parameter into the image forming member, the second parameter containing a history which has been updated in response to the image formation on the image forming member.

[0008]

Preferably, the first parameter includes at least information indicating a mode of an image formation on the image forming member, a size of the formed image, and number of the image formation.

[0009]

Preferably, the history contained in the second parameter includes at least information a size change of the image formed on the image forming member.

[0010]

Also, an image forming method, according to the present invention, for forming an image displayed on an image display member on an image forming member to which the image is to be formed, in which the image display member stores a first parameter, and outputs the stored first parameter to an external, the first parameter indicating a way to form the displayed image and a history of the displayed image, or indicating any one of the way and the history, includes: reading the displayed image; reading the first parameter output from the image display member; and forming the read image based upon the read first parameter on the image forming member.

[0011]

Preferably, the image forming member stores the first parameter written from the external, and outputs the stored first parameter to the external; and the image forming method further includes: writing one of the read first parameter and a second parameter into the image forming member, the second parameter including a history which has been updated in response to the image formation on the image forming member.

[0012]

Further, according to a computer program of the present invention, in the computer program executed by a computer employed in an image forming apparatus for forming an image displayed on an image display member,

the image display member storing a first parameter, and outputting the stored first parameter an external unit, the first parameter indicating a way to form the displayed image and a history of the displayed image, or indicating any one of the way and the history, the program causes the computer to execute: a step for reading the displayed image; a step for reading the output first parameter; and a step for forming the read image based upon the read first parameter on the image forming member.

[0013]

Preferably, the image forming member stores the parameter written from the external, and outputs the stored parameter to the external, and the program causes the computer to further execute: a step in which one of the read first parameter and a second parameter is written into the image forming member, the second parameter including a history which has been updated in response to the image formation on the image forming member.

[0014]

[Embodiment Mode for Carrying out the Invention]

[BACKGROUND]

First of all, for an easy understanding of the present invention, a technical background thereof will now be described.

Normally, in copying machines, users who try to make copies, not writers who have written original papers, will set printing methods, for instance, will set whether

color copies, or black/white copies are made; will set how many copies are produced; will set whether original papers are copied in an equi-magnification mode, an enlarge-magnification mode, or a compression-magnification mode.

However, when color original papers are copied in the black/white copying mode, there are some possibilities that intentions of writers who have written these color original papers cannot be reflected thereon.

Also, users who have not so many experiences may possibly set erroneous total numbers of copies.

The present invention has been made by considering such a difficult aspect, and therefore can make up such a device that while writers of original images have previously stored printing parameters for designating copies (image formations) into original papers, these original papers may be copied by reflecting thereon intentions of these writers.

[0015]

Fig. 1 is a diagram for showing a mode of an N-up printing operation (will be explained later) in an exemplification manner. Fig. 1(A) indicates 16 sheets of original papers "A" to "P". Fig. 1(B) represents a printing result of a 2-up printing operation in which 16 sheets of these original papers "A" to "P" are printed on 8 sheets of printing papers every two sheets of these original papers "A" to "P". Also, Fig. 1(C) shows a

printing result of a 4-up printing operation which is obtained by furthermore performing a 2-up printing operation with respect to the printing result indicated in Fig. 1(B). Further, Fig. 1(D) shows a printing result of an 8-up printing operation which is obtained by furthermore performing a 2-up printing operation with respect to the printing result indicated in Fig. 1(C).

In order to save printing papers during printing operations, there are some cases that, as illustrated in Fig. 1(A) to Fig. 1(D), plural (N) sheets of original papers are combined with each other, and then, the combined original paper is printed on a single sheet of printing paper (namely, N-up printing operation).

[0016]

In this case, for example, as indicated in Fig. 1(C), in such a case that an original paper has already been printed in the 4-up printing mode, when this original paper is furthermore tried to be printed in the 2-up printing mode, there are some possibilities that images of printed articles may become excessively small (as indicated in Fig. 1(D)), may become destroyed, and therefore, can be hardly read/discriminated.

In such a case, if the following information has already been stored so as to prohibit another N-up printing operation, then user friendly conditions may be established. That is, while such an information that the original paper has already been printed in the 4-up

printing operation (see Fig. 1(C)) is stored in the original paper (printing paper), the execution of another N-up printing operation (namely, 8-up printing operation shown in Fig. 1(D)) may be prohibited, resulting in such user friendly conditions.

The present invention has been made by also considering such a point, and therefore, can make up such a device that since a history of image printing operations (image forming operations) may be read out from an original paper, superior readable/discriminatable printing results may be continuously obtained.

[0017]

[FIRST EMBODIMENT MODE]

A first embodiment mode of the present invention will now be explained.

In accordance with an image forming method represented as the first embodiment mode, while a printing parameter used to instruct (designate) a printing method is read out from an IC chip which has been attached to an original paper, a printing operation (namely, image forming operation) may be carried out based upon this printing parameter which is read from the IC chip.

[0018]

[COMPOSITE COPYING MACHINE 1]

Fig. 2 is a diagram for exemplifying a hardware structure of a composite copying machine 1 to which an image forming method according to the present invention

may be applied, while a control apparatus 2 of this composite copying machine 1 is mainly illustrated.

As represented in Fig. 2, the composite copying machine 1 is arranged by the control apparatus 2 and an apparatus main body 10.

The control apparatus 2 is constituted by a control apparatus main body 20, a communication apparatus 22, a recording apparatus 24 such as an HDD/CD apparatus, a user interface apparatus (UI apparatus) 26, and first and second IC chip interfaces (IC chip IF) 28-1 and 28-2. The control apparatus main body 20 contains a CPU 202, a memory 204, and the like. The user interface apparatus 26 contains either an LCD display apparatus or a CRT display apparatus, and a keyboard/touch panel, and so on. The first and second IC chip interfaces 28-1 and 28-2 contain a first antenna 280-1 and a second antenna 280-2.

[0019]

[APPARATUS MAIN BODY 10]

Fig. 3 is a diagram for showing a hardware structure of the apparatus main body 10 indicated in Fig. 2 in an exemplification manner.

As indicated in Fig. 3, the apparatus main body 10 is arranged by a paper tray section 12, a print engine 14, a scanner 16, an original feeding apparatus 18, and the like. The print engine 14 prints images on printing papers 42 (image forming operation) which are fed from the paper tray section 12, or the like by way of the

xerography technique and the like. The scanner 16 reads out images of an original paper 40. The original feeding apparatus 18 feeds the original paper 40.

[0020]

Also, in the apparatus main body 10, both the first IC chip IF 28-1 and the first antenna thereof 280-1 are arranged in the vicinity of an original feeding path of the original feeding apparatus 18, through which the original paper 40 is fed, or transported.

Also, both the second IC chip IF 28-2 and the second antenna thereof 280-2 are arranged in the vicinity of a printing paper transport path 100 through which the printing papers 42 are fed, or transported. It should be understood that both the second IC chip IF 28-2 and the second antenna 280-2 are required in a second embodiment mode of the present invention as to the composite copying machine 1.

Also, the UI (user interface) apparatus 26 is arranged at an upper portion of the apparatus main body 10.

[0021]

In other words, the composite copying machine 1 may be realized by employing such a hardware structure that both the first and second IC chip IF 28-1, 28-2 and the first and second antennas 280-1, 280-2 are additionally provided in a general-purpose composite copying machine having a function by which an image of the original paper

40 fed from the original feeding apparatus 18 is read to be printed out, and another function by which this image is transmitted in a FAX (facsimile) mode.

It should be noted that as represented in Fig. 3, the control apparatus 2 (see Fig. 2) is actually stored inside the apparatus main body 10.

[0022]

[ORIGINAL PAPER 40]

Fig. 4 is a diagram for illustratively showing the original paper 40 shown in Fig. 2 and Fig. 3 in an exemplification manner.

As indicated in Fig. 4, either a color image or a black/white image such as a text and an image, which are designed to be read, or image-formed by the composite copying machine 1, is indicated on the original paper 40. A first IC chip 3 is applied to this original paper 40 by way of either a pasting method or an embedding method.

[0023]

[IC CHIP 3/IC CHIP IF 28]

Fig. 5 is a diagram for schematically showing a structure of the first IC chip 3 shown in Fig. 4.

Fig. 6 is a diagram for schematically indicating an arrangement of the first and second IC chip IF 28-1 and 28-2 shown in Fig. 2 and Fig. 3.

As represented in Fig. 5, the first IC chip 3 is constituted by an antenna 300, a clock reproducing circuit 320, a memory circuit 322, a data transmitting/receiving

circuit 324, and a power supply circuit 326.

It should also be noted that when it is so guaranteed that the IC chip 3 of the original paper 40 passes through an area in close proximity to the antenna 280, such an IC chip 3 having no antenna 300 may be employed.

In such a case that there are plural sets of essentially same structural elements such as the first IC chip IF 28-1 and the second IC chip IF 28-2 in the below-mentioned descriptions, these IC chip IF 28-1 and 28-2 will be abbreviated as a general-termed "IC chip IF 28" hereinafter.

[0024]

Also, as shown in Fig. 6, the IC chip IF 28 is constructed of a transmission circuit 284, a reception circuit 286, a transmission/reception control circuit 282, a demodulation circuit 288, and a modulation circuit 290.

In accordance with the below-mentioned operations of the respective structural units employed in the IC chip 3 and the IC chip IF 28, information (data) may be written into the IC chip 3 via the IC chip IF 28 in a non-contact manner, and further, information (data) which has been stored in the IC chip 3 may be read out therefrom via the IC chip IF 28 in a non-contact manner.

[0025]

In the IC chip 3 (see Fig. 5), the power supply circuit 326 rectifies an electromagnetic wave signal supplied

via the antenna 300 so as to supply electric power to the respective structural units of the IC chip 3, while this electric power is required for these structural units.

[0026]

The clock reproducing circuit 320 reproduces a clock signal from the electromagnetic wave signal supplied from the antenna 300 via the IC chip IF 28, and then, outputs this reproduced clock signal to the memory circuit 322 and the data transmitting/receiving circuit 324.

[0027]

The memory circuit 324 is, for example, a nonvolatile RAM (random access memory). This memory circuit 324 stores thereinto data indicative of information which is inputted from the data transmitting/receiving circuit 324 in synchronism with the clock signal entered from the clock reproducing circuit 320.

Also, the memory circuit 322 outputs such a data indicative of information stored therein with respect to the data transmitting/receiving circuit 324 in synchronism with the above-described clock signal.

To clarify and embody an explanation, in the first embodiment mode, it should be understood that such a case is assumed as a concrete example. That is, in this concrete example, a printing parameter (will be discussed later with reference to Fig. 8) capable of designating a printing method of an image has been stored in the memory

circuit 322 at a stage that the IC chip 3 is attached to the original paper 40.

[0028]

The data transmitting/receiving circuit 324 demodulates data from the electromagnetic wave signal entered via the antenna 300, and then, outputs this demodulated data with respect to the memory circuit 322 in synchronism with the clock signal entered from the clock reproducing circuit 320.

Also, the data transmitting/receiving circuit 324 changes a reflection strength of an electromagnetic wave signal supplied from the IC chip IF 28 in accordance with a data value entered from the memory circuit 322 in synchronism with the above-described clock signal.

As previously explained, the data indicative of the information which has been stored in the memory circuit 322 may be transmitted from the IC chip 3 to the IC chip IF 28 by changing the strength of the reflection signal of the electromagnetic wave signal transmitted from the IC chip IF 28 to the IC chip 3.

[0029]

In the IC chip IF 28 (Fig. 6), the transmission/reception control circuit 282 controls operations of the respective structural units of this IC chip IF 28.

Also, this transmission/reception control circuit 282 outputs such data entered from the control apparatus

main body 20 (namely, first printing program 5; will be discussed later with reference to Fig. 7) with respect to the demodulation circuit 288.

Further, this transmission/reception control circuit 282 outputs such a data which has been received by the reception circuit 286 and then has been demodulated by the demodulation circuit 288 with respect to the control apparatus main body 20.

[0030]

The modulation circuit 290 modulates a high frequency signal (radio frequency signal) based upon data entered from the transmission/reception control circuit 282 to produce an electromagnetic wave signal, and then, outputs this produced electromagnetic wave signal to the transmission circuit 284.

[0031]

The transmission circuit 284 transmits the electromagnetic wave signal via the antenna 280 to the IC chip 3, while this electromagnetic wave signal contains data to be stored in the IC chip 3, and the clock signal.

[0032]

The reception circuit 296 receives a reflection signal which is reflected from the IC chip 3, and then outputs this received reflection signal to the demodulation circuit 288.

[0033]

The modulation circuit 288 demodulates the data

transmitted from the IC chip 3 based upon a change of the reflection signal entered from the reception circuit 286, and then outputs the demodulated data to the transmission/reception control circuit 282.

[0034]

[FIRST PRINTING PROGRAM 50]

Fig. 7 is a block diagram for schematically indicating a structure of a first printing program 50 which is executed by the control apparatus 2 (see Fig. 2 and Fig. 3) so as to realize the image forming method according to the present invention.

As shown in Fig. 7, the first printing program 50 is arranged by an image reading section 500, a user interface (UI) section 510, a data reading section 520, a parameter selecting section 530, an image processing section 532, and a printing control section 540.

The printing program 50 is supplied via, for example, a recording medium 240 (see Fig. 2) to the control apparatus 2, and is loaded to the memory 204 so as to be executed.

The first printing program 50 reads out a printing parameter for designating a printing method, which has been stored in the IC chip (Fig. 4 and Fig. 5), and then, prints out the image read from the original paper 40 on the printing paper 42 in accordance with the read printing parameter. The printing method covers a color copy/black/white copy; a total printing number; equi-magnification/enlargement/compression modes; an

N-up printing mode; and the like.

[0035]

In the first printing program 50, the image reading section 500 reads out an image of the original paper 40 (Fig. 4), or the like, while the structural units of the apparatus main body 10 such as the original feeding apparatus 18 and the scanner 16 (Fig. 3) are controlled under control of the operation control unit 506.

[0036]

The UI section 510 accepts operation of a user with respect to the UI apparatus 26 (Fig. 2 and Fig. 3), and outputs a printing parameter (will be indicated as "printing parameter (user)" in drawing) which has been set by the user with respect to the parameter selecting section 530.

[0037]

Fig. 8 is a diagram for indicating data stored in the IC chip 3 in an exemplification manner. As exemplified in Fig. 8, such data as histories and error detection/correction codes thereof are stored in a printing parameter (will be indicated as "printing parameter (IC)" in drawing) into the IC chip 3 (Fig. 4 etc.).

The data reading section 520 controls the first IC chip IF 28-1 (Fig. 2 etc.) so as to read out data which has been stored in the memory circuit 322 (Fig. 5) of the IC chip 3, and then, outputs the read data to the

parameter selecting section 530.

It should also be noted that both a check as to whether or not the data derived from the IC chip 3 can be read out under normal condition, and another check as to whether or not the IC chip 3 is attached to the original paper 40 may be made by employing the following method. That is, the data reading section 520 may check as to whether or not an error happens to occur in the read data by employing the error detection/correction code.

[0038]

The parameter selecting section 530 (Fig. 7) selects either a printing parameter (IC) entered from the data reading section 520 or a printing parameter (user) entered from the UI section 510 in response to an operation of the user with respect to the UI section 510, and a check result as to whether or not the IC chip 3 is attached to the original paper 40. Then, this parameter selecting section 530 outputs the selected printing parameter (IC, or user) to both the image processing section 532 and the printing control section 540.

In other words, for instance, in such a case that the parameter selecting section 530 can read out the printing parameter (IC) from the IC chip 3 attached to the original paper 40 (Fig. 4 etc.) under normal condition, the parameter selecting section 530 selects the printing parameter (IC) under such a condition that the user can agree. In other cases, the parameter selecting section

530 selects the printing parameter (user) entered from the UI section 510. Thereafter, the parameter selecting section 530 outputs this selected printing parameter (user), or the above-selected printing parameter (IC) to both the image processing section 532 and the printing control section 540.

[0039]

The image processing section 532 (Fig. 7) performs such a process operation as enlargement/compression and an N-up image with respect to the image of the original paper 40 (Fig. 4 etc.) entered from the image reading section 500 in accordance with the printing parameter entered from the parameter selecting section 530, and then, outputs the processed image to the printing control section 540.

In other words, for instance, in the case that the printing parameter designates the N-up printing operation with respect to the image entered from the image reading section 500, the image processing section 532 performs such an image processing operation designed for the N-up printing operation, whereas in the case that the printing parameter designates the enlarging/compressing operation, the image processing section 532 executes the enlarging/compressing process operation of the image entered from the image reading section 500.

[0040]

The printing control section 540 (Fig. 7) controls

a structural unit of the apparatus main body 10 such as the paper tray section 12 (Fig. 2) and the print engine 14 in accordance with a printing parameter entered from the parameter selecting section 530 so as to print out the processed image obtained by the image processing section 532.

In other words, for example, the printing control section 540 prints out the processed image which is entered from the image processing section 532 in either the color print mode or the black/white print mode with respect to the printing papers 42, the quantity of which is designated by the printing parameter, in response to this printing parameter.

[0041]

[OVERALL OPERATION]

Next, overall operation of the above-described composite copying machine 1 (first printing program 50) is described.

Fig. 9 is a flow chart for describing operation (defined in S10) of the composite copying machine 1 (namely, first printing program 50; Fig. 7).

As indicated in Fig. 9, in a step 100 (S100), the user executes only an operation for commencing a printing operation, or executes both an operation for setting a printing parameter and an operation for commencing a printing operation with respect to the UI apparatus 26 (Fig. 26 etc.).

When the UI section 510 (Fig. 7) accepts the operation made by the user and the user sets a printing parameter, this UI section 510 outputs this printing parameter (printing parameter (user)) to the parameter selecting section 530.

[0042]

In a step 102 (S102), the data reading section 520 controls the first IC chip IF 28-1 (Fig. 2 and Fig. 3) so as to read out a printing parameter (printing parameter (IC)) from the original paper 40 (Fig. 4 etc.) transported through the original paper transport path 102.

[0043]

In a step 104 (S104), the image reading section 500 controls the scanner 16 (Fig. 3) and the like so as to read out an image from the original paper 40 (Fig. 4 etc.) transported via the original paper transport path 102.

[0044]

In a step 106 (S106), the parameter selecting section 530 (Fig. 7) judges as to whether or not the IC chip 3 is attached to the original paper 40 (Fig. 4 etc.).

In the case that the IC chip 3 is attached to the original paper 40, the first printing program 50 is advanced to a process operation defined in a step S110, whereas in other cases, the first printing program 50 is advanced to another process operation defined in a step S108.

[0045]

In a step 108 (S108), the parameter selecting section 530 (Fig. 7) outputs the printing parameter (user) entered from the UI section 510 with respect to both the image processing section 532 and the printing control section 540.

In such a case that the user does not clearly set the printing parameter in the above-described process operation of the step S100, the parameter selecting section 530 outputs such a printing parameter which has been set by the default value with respect to both the printing process section 532 and the printing control section 540.

Both the image processing section 532 and the printing control section 540 perform a printing operation with respect to the printing paper 42 (Fig. 2 etc.) in accordance with the printing parameter (user) entered from the parameter selecting section 530.

[0046]

In a step 110 (S110), the parameter selecting section 530 (Fig. 7) judges as to whether or not there is such a printing parameter (user) which has been set by the user in the process operation defined in the step S100.

In the case that there is the printing parameter (user) which has been set by the user, the first printing program 50 is advanced to a process operation defined in a step S112, whereas in other cases, the first printing program 50 is advanced to another process operation

defined in a step S116.

[0047]

In the step 112 (S112), the UI section 510 (Fig. 7) displays on the UI apparatus 26 (Fig. 3), such a message that a printing operation is carried out in accordance with not such printing parameter (user) set by the user, but the printing parameter (IC) read out from the IC chip 3.

[0048]

In a step 114 (S114), the UI section 510 judges as to whether or not the user executes such an operation by which the user can agree that the printing operation is carried out in accordance with the printing parameter (IC) read from the IC chip 3.

In the case that the user-agreed operation is carried out, the first printing program 50 is advanced to a process operation defined in a step S116, whereas in other cases, the first printing program 50 is advanced to another process operation defined in a step S118.

[0049]

In the step 116 (S116), the parameter selecting section 530 (Fig. 7) outputs the printing parameter (IC) read out from the IC chip 3 (Fig. 4 etc.) with respect to both the image processing section 532 and the printing control section 540.

Both the image processing section 532 and the printing control section 540 execute a printing operation

with respect to the printing paper 42 (Fig. 2 etc.) in accordance with the printing parameter (IC) entered from the parameter selecting section 530.

[0050]

In the step 118 (S118), the first printing program 50 ceases the printing operation.

[0051]

[MODIFICATION]

Fig. 10 is a diagram for indicating a structure of a second IC chip 34 according to the present invention in an exemplification manner.

Fig. 11 is a block diagram for representing a structure of a second printing program 52.

As shown in Fig. 10, the second IC chip 34 employs such a structure that an encryption circuit 340 is additionally interposed between the memory circuit 322 and the data transmitting/receiving circuit 324 of the first IC chip 3 (see Fig. 5).

As indicated in Fig. 11, the second printing program 52 employs such an arrangement that a decryption section 522 is additionally interposed between the data reading section 520 and the parameter selection section 530 of the first printing program 50.

It should be understood that the same reference numerals used in the respective structural components of the above-described first IC chip 3 will be employed as those for denoting the essentially same structural

components of this second IC chip 34, and furthermore, the same reference numerals used in the respective structural components of the first printing program 50 will be employed as those for denoting the essentially same structural components of the second printing program 52.

[0052]

In such a case that the first IC chip 3 is provided with the encryption unit 340 and the second printing program 52 is provided with the decryption section 540, in the second IC chip 34, the encryption unit 340 reads out a printing parameter from the memory circuit 322 in synchronism with the clock signal, and then encrypts this read printing parameter to output the encrypted printing parameter to the data transmitting/receiving circuit 324.

The data (printing parameter) which has been encrypted and outputted is decrypted by the decryption section 522 in the second printing program 52, and thereafter, the decrypted data is processed in the process operation shown in Fig. 9.

As previously described, it is preferable to execute such an operation that while the data is encrypted in the second IC chip 34, the encrypted data is decrypted in the second printing program 52 in order to improve secrecy of information.

[0053]

[SECOND EMBODIMENT MODE]

Next, a description will now be made of a second embodiment mode according to the present invention.

In an image forming method indicated as the second embodiment mode, both a printing parameter which is read out from an IC chip attached to an original paper and a history of printing operations are written in another IC chip attached to a printing paper.

Further, such a history indicating how an image of an original paper has been so far printed (for instance, conditions of N-up printing operation shown in Fig. 1(A) to Fig. 1(D)) is written in the IC chip attached to the original paper, and thus, this written history may be employed in a printing operation.

[0054]

[THIRD PRINTING PROGRAM 54]

Fig. 12 is a block diagram for showing a structure of a third printing program 54 capable of realizing the image forming method of the present invention, which is executed by the control apparatus 2 (Fig. 2 and Fig. 3) instead of the first printing program 50 shown in Fig. 7.

Fig. 13 is a diagram for representing such a printing paper 42 to which the first IC chip 3 has been attached. Fig. 13(A) shows the printing paper 42 before an image is printed thereon, and Fig. 13(B) shows the printing paper 42 after the image has been printed thereon.

It should be understood that the same reference

numerals used in the respective structural components of both the first printing program 50 and the second printing program 52 will be employed as those for denoting the essentially same structural components of the third printing program 54.

[0055]

In the second embodiment mode, as represented by using blanks in Fig. 8, a history of printing operations is furthermore written into the first IC chip 3 (Fig. 4 etc.) attached to the original paper 40.

As shown in Fig. 12, the third printing program 54 employs such a construction that a data writing section 524 is additionally provided with the structures of the first printing program 50.

In this third printing program 54, the data reading section 520 reads out the printing parameter (IC) from the first IC chip 3 attached to the original paper 40 in addition to the above-explained history, and then, outputs these read printing parameter (IC) and history to the parameter selecting section 530.

[0056]

Also, the parameter selecting section 530 selects any one of the printing parameter (user) which is entered from the UI section 510, the printing parameter (user) which is entered from the data reading section 520, and the history (also, there is such a case that only printing parameter is selected), and then, outputs the selected

item with respect to both the image processing section 532 and the printing control section 540.

Also, the parameter selecting section 530 outputs any one of the printing parameter (user) and the printing parameter (IC) with respect to the data writing section 524.

[0057]

Similar to the above-described first embodiment mode, both the image processing section 532 and the printing control section 540 may perform a printing operation in accordance with the printing parameter entered from the parameter selecting section 530, and furthermore, may execute a printing operation in accordance with the input supplied from the parameter selecting section 530.

In other words, for instance, in such a case that a history read out from the first IC chip 3 indicates that the image of the original paper 40 has been printed out in the equi-magnification printing mode, both the image processing section 532 and the printing control section 540 may perform a printing operation in any one of the equi-magnification printing mode, the 2-up printing mode, the 4-up printing mode (see Fig. 1(A) to Fig. 1(C)), and the compression printing mode in response to an instruction issued from the user.

[0058]

Also, for instance, when a history read out from the first IC chip 3 indicates that an image of an original

paper 40 has been printed in the 2-up printing mode, both the image processing section 532 and the printing control section 540 perform such a printing operation only in either the equi-magnification printing mode or the 2-up printing mode in accordance with an instruction issued by the user, and also, prohibit that such a printing operation is carried out in both the 4-up printing operation and the compression printing operation, which may cause such a possibility that printed images of the original paper 40 cannot be read/discriminated.

[0059]

Also, for instance, when a history read out from the first IC chip 3 indicates that an image of an original paper 40 has been printed in the 2-up printing mode, both the image processing section 532 and the printing control section 540 perform such a printing operation only in either the equi-magnification printing mode or the 2-up printing mode in accordance with an instruction issued by the user, and also, prohibit that such a printing operation is carried out in the 4-up printing operation, which may cause such a possibility that printed images of the original paper 40 cannot be read/discriminated.

Also, similarly, both the image processing section 532 and the printing control section 540 prohibit that such a printing operation is carried out in the compressed-magnification mode, which may cause such a possibility that printed images of the original paper

40 cannot be read/discriminated.

Also, for instance, when a history read out from the first IC chip 3 indicates that an image of an original paper 40 has been printed in the 4-up printing mode, both the image processing section 532 and the printing control section 540 perform such a printing operation only in either the equi-magnification printing mode or the 2-up printing mode in accordance with an instruction issued by the user.

[0060]

Furthermore, when the image processing section 532 prints out an image on the printing paper 42, this image processing section 532 outputs such an information that the printing operation has been carried out for this image in the N-up processing operation, the enlarging process operation, or the compressing process operation as a new history with respect to the data writing section 524.

[0061]

The data writing section 524 controls the second IC chip IF 28-2 (Fig. 2 and Fig. 3) so as to store both the printing parameter entered from the parameter selecting section 530 and the history entered from the image processing section 532 into the first IC chip 3 attached to the printing paper 42, as indicated in Fig. 13(A) and Fig. 13(B).

[0062]

[OVERALL OPERATION]

Next, a description is made of overall operation of the composite copying machine 1 (namely, third printing program 54 shown in Fig. 12) according to the second embodiment mode.

Fig. 14 is a flow chart for describing the overall operation (defined in step S12) of the composite copying machine 1 according to the second embodiment mode.

As indicated in Fig. 14, the third printing program 54 executes such a process operation similar to the process operation defined in the step S10 shown in Fig. 9 in accordance with either a printing parameter (user) set by a user or printing parameter/history which are read from the IC chip 3 (Fig. 4 etc.), and thus, obtains a print result (see Fig. 13(B)).

[0063]

After the process operation defined in either the step S108 or the step S116 (Fig. 9) has been carried out, the printing program 54 (Fig. 12) is advanced to a process operation defined in a step S120 of Fig. 14.

In this step 120 (S120), the data reading section 520 controls the second IC chip IF 28-2 in order to read out data from the first IC chip 3 attached to the printing paper 42 (Fig. 13(B)), and also, to detect the first IC chip 3 attached to the printing paper 42 which is transported through the printing paper transport path 100.

[0064]

In a step 122 (S122), the data reading section 520 judges as to whether or not the first IC chip 3 (see Fig. 13(B)) is attached to the printing paper 42.

The printing program 54 is advanced to a process operation defined in a step S124 in such a case that the IC chip 3 is attached to the printing paper 42, whereas the process operation of this printing program 54 is accomplished in other cases.

[0065]

In a step 124 (S124), the data writing section 524 controls the second IC chip IF 28-2 (Fig. 2 and Fig. 3) in order that both a printing parameter entered from the parameter selecting section 530 and a history entered from the image processing section 532 are written into the first IC chip 3 attached to the printing paper 42 which is fed through the printing paper transport path 100 (Fig. 3).

[0066]

[Effects of the Invention]

As previously described, in accordance with the image forming system and the image forming method of the present invention, while utilizing the semiconductor chip from which the data stored thereinto can be read in the non-contact manner, the setting information of the image forming operation is stored in the original paper, and the image forming operation can be carried out by employing the stored setting information of the image forming

operation.

Also, in accordance with the image forming system and the image forming method of the present invention, while both the setting information of the image forming operation and the history are stored, when the image which has been formed on the printing paper is used to be furthermore formed, both the setting information and the history can be utilized.

[Brief Description of the Drawings]

[Fig. 1]

Fig. 1 is a diagram for showing a mode of an N-up printing operation in an exemplification manner; Fig. 1(A) indicates 16 sheets of original papers "A" to "P"; Fig. 1(B) represents a printing result of a 2-up printing operation in which 16 sheets of these original papers "A" to "P" are printed on 8 sheets of printing papers every two sheets of these original papers "A" to "P"; Fig. 1(C) shows a printing result of a 4-up printing operation which is obtained by furthermore performing a 2-up printing operation with respect to the printing result indicated in Fig. 1(B); and, Fig. 1(D) shows a printing result of an 8-up printing operation which is obtained by furthermore performing a 2-up printing operation with respect to the printing result indicated in Fig. 1(C).

[Fig. 2]

Fig. 2 is a diagram for representing a hardware structure of a composite copying machine to which an image forming method according to the present invention is applied, i.e., for mainly exemplifying a control apparatus thereof.

[Fig. 3]

Fig. 3 is a diagram for exemplifying a hardware construction of an apparatus main body indicated in Fig. 2.

[Fig. 4]

Fig. 4 is a diagram for exemplifying an original paper indicated in Fig. 2 and Fig. 3.

[Fig. 5]

Fig. 5 is a diagram for showing a structure of a first IC chip indicated in Fig. 4.

[Fig. 6]

Fig. 6 is a diagram for indicating a structure of an IC chip IF shown in Fig. 2 and Fig. 3.

[Fig. 7]

Fig. 7 is a diagram for representing a structure of a first printing program which is executed by the control apparatus (Fig. 2 and Fig. 3) so as to realize the image forming method according to the present invention.

[Fig. 8]

Fig. 8 is a diagram for exemplifying data stored in the IC chip.

[Fig. 9]

Fig. 9 is a flow chart for describing operations (S10) of the composite copying machine (first printing program Fig. 7) shown in Fig. 2 and Fig. 3.

[Fig. 10]

Fig. 10 is a diagram for exemplifying a structure of a second IC chip.

[Fig. 11]

Fig. 11 is a diagram for representing a structure of a second printing program.

[Fig. 12]

Fig. 12 is a diagram for indicating a structure of a third printing program which is executed by the control apparatus (Fig. 2, Fig. 3) so as to realize an image forming method according to the present invention instead of the first printing program shown in Fig. 7.

[Fig. 13]

Fig. 13 is a diagram for indicating a printing paper to which an IC chip has been attached; Fig. 13(A) is a diagram for showing a printing paper before an image is printed out; and Fig. 13(B) is a diagram for representing a printing paper after the image is printed out.

[Fig. 14]

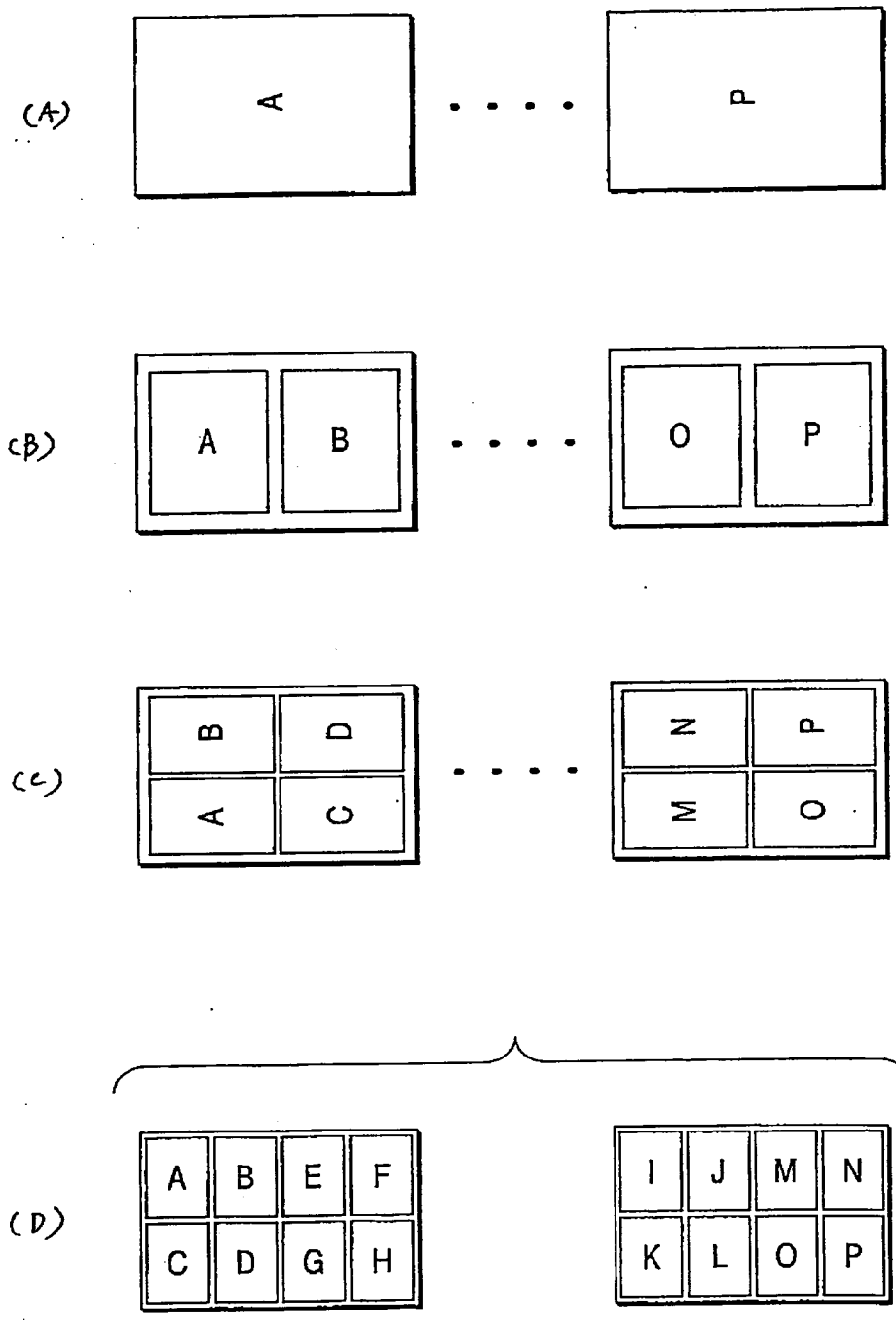
Fig. 14 is a flow chart for representing overall operation (S12) of a composite copying machine (third printing program; Fig. 12) according to the second embodiment mode.

[Description of Reference Numerals]

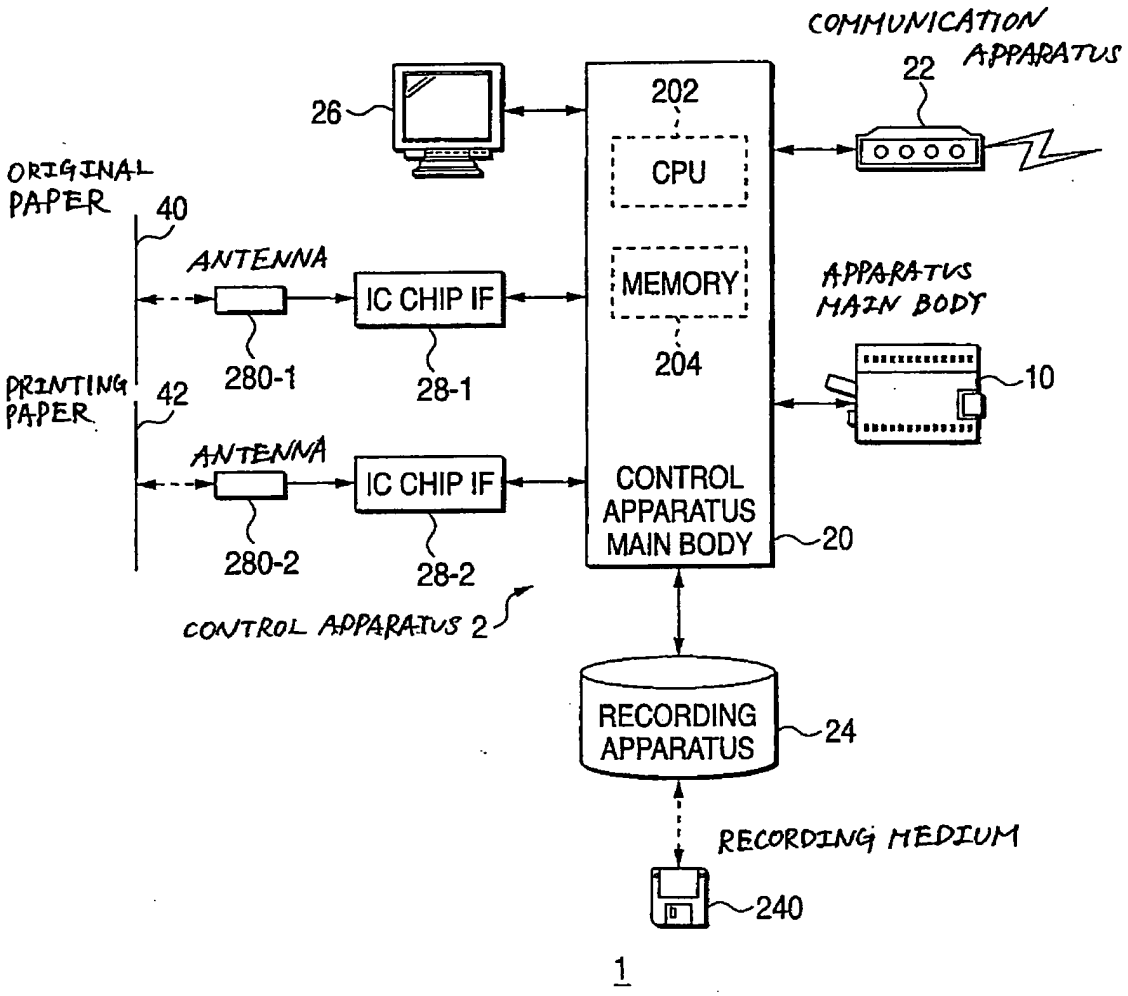
1 --- composite copying machine; 12 --- paper tray section; 14 --- print engine; 16 --- scanner; 18 --- original feeding apparatus; 100 --- printing paper transport path; 102 --- original paper transport path; 2 --- control apparatus; 20 --- control apparatus main body; 202 --- CPU; 204 --- memory; 22 --- communication apparatus; 24 --- recording apparatus; 240 --- recording medium; 26 --- UI apparatus; 28 --- IC chip IF; 280 --- antenna; 282 --- transmitting/receiving control circuit; 284 --- transmission circuit; 286 --- reception circuit; 288 --- demodulation circuit; 290 --- modulation circuit; 50, 52, 54 --- printing program; 500 --- image reading section; 510 --- UI section; 520 --- data reading section; 522 --- decrypting section; 524 --- data writing section; 530 --- parameter selecting section; 532 --- image processing section; 540 --- printing control section; 40 --- original paper; 334 --- IC chip; 300 --- antenna; 320 --- clock reproducing circuit; 322 --- memory circuit; 324 --- data transmitting/receiving circuit; 326 --- power supply circuit; 340 --- encrypting circuit; 42 --- printing paper;

[Designation of Document] Drawing

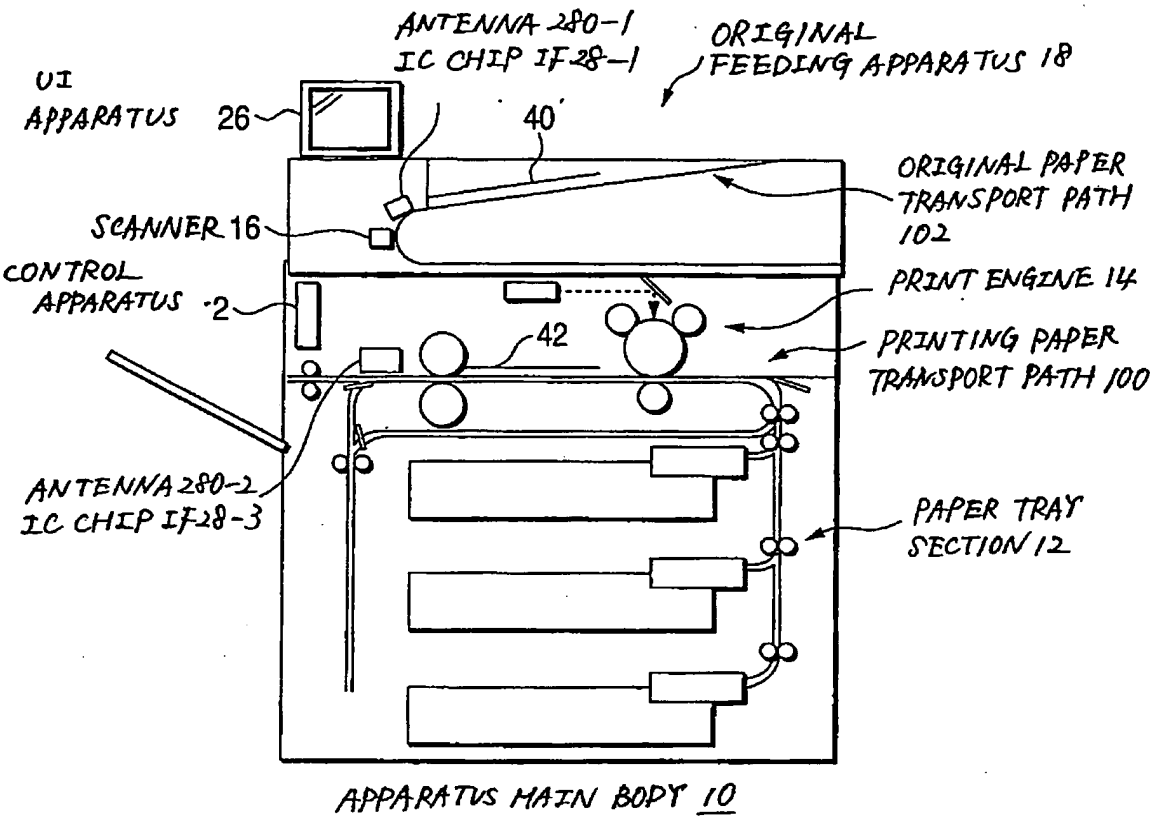
[Fig. 1]



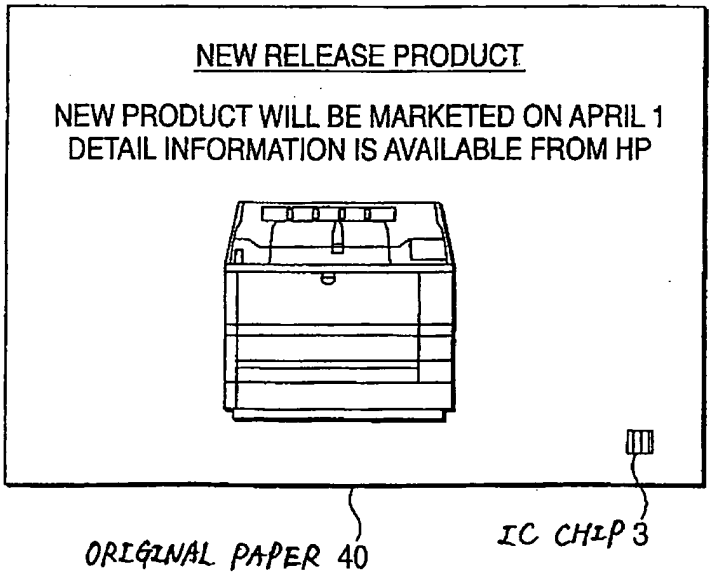
[FIG. 2]


COMMUNICATION APPARATUS
22
26
202
CPU
ORIGINAL PAPER
40
ANTENNA
IC CHIP IF
MEMORY
APPARATUS MAIN BODY
280-1
28-1
204
PRINTING PAPER
42
10
ANTENNA
IC CHIP IF
CONTROL APPARATUS MAIN BODY
20
280-2
28-2
CONTROL APPARATUS 2
RECORDING APPARATUS
24
RECORDING MEDIUM
240
1

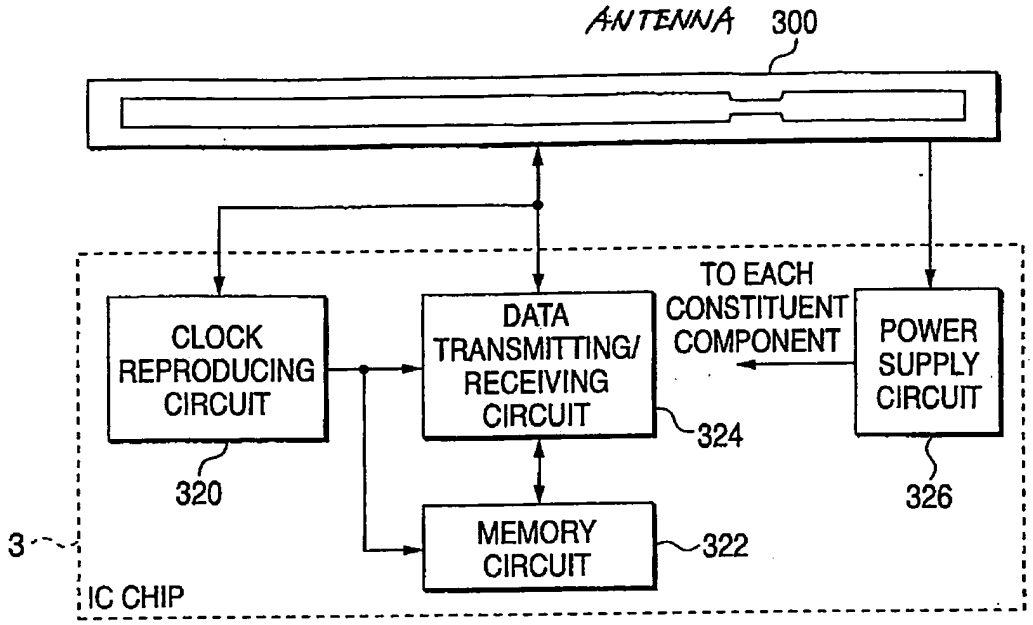
[FIG. 3]


ANTENNA 280-1
IC CHIP IF28-1
ORIGINAL FEEDING APPARATUS 18
UI APPARATUS 26
40
ORIGINAL PAPER TRANSPORT PATH 102
SCANNER 16
CONTROL APPARATUS 2
PRINT ENGINE 14
42
PRINTING PAPER TRANSPORT PATH 100
ANTENNA 280-2
IC CHIP IF28-3
PAPER TRAY SECTION 12
APPARATUS MAIN BODY 10

[FIG. 4]


NEW RELEASE PRODUCT
NEW PRODUCT WILL BE MARKETED ON APRIL 1
DETAIL INFORMATION IS AVAILABLE FROM HP
ORIGINAL PAPER 40
IC CHIP 3

[FIG. 5]


ANTENNA
300
CLOCK REPRODUCING CIRCUIT
320
DATA TRANSMITTING/ RECEIVING CIRCUIT
324
TO EACH CONSTITUENT COMPONENT
POWER SUPPLY CIRCUIT
326
MEMORY CIRCUIT
322
3
IC CHIP

[FIG. 6]

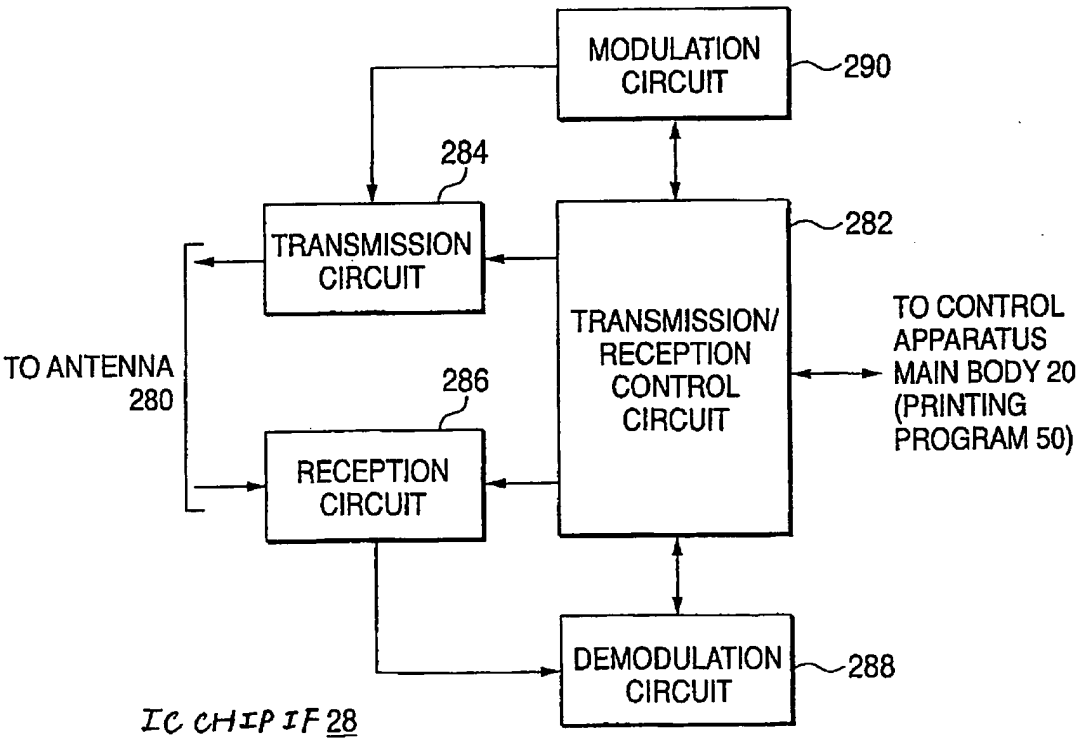
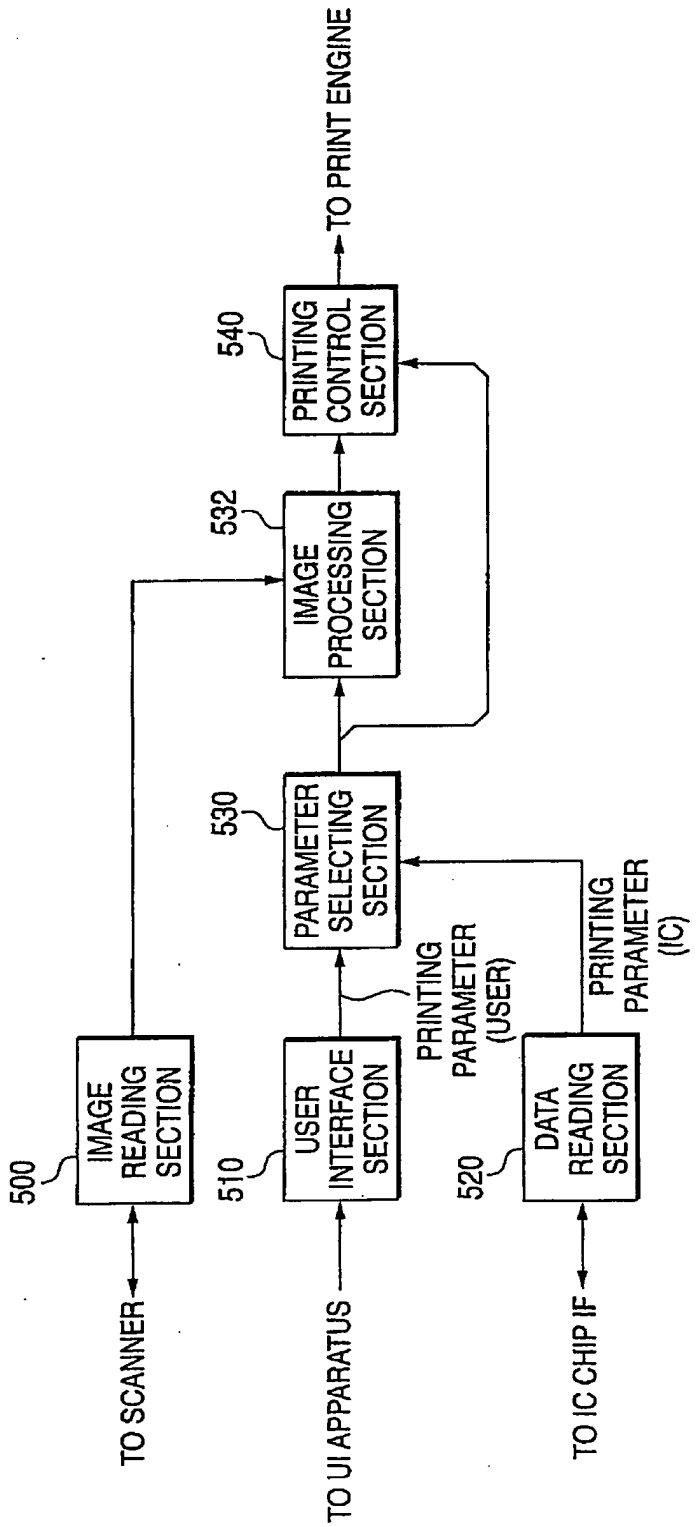
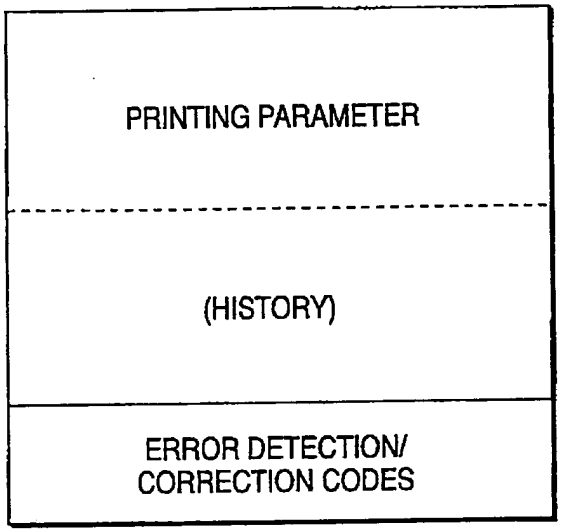

MODULATION CIRCUIT
290
284
TRANSMISSION CIRCUIT
282
TRANSMISSION/ RECEPTION CONTROL CIRCUIT
TO CONTROL APPARATUS MAIN BODY 20 (PRINTING PROGRAM 50)
TO ANTENNA 280
286
RECEPTION CIRCUIT
DEMODULATION CIRCUIT
288
IC CHIP IF 28

FIG. 7


TO SCANNER
TO UI APPARATUS
TO IC CHIP IF
500
IMAGE READING SECTION
510
USER INTERFACE SECTION
520
DATA READING SECTION
PRINTING PARAMETER (USER)
PRINTING PARAMETER (IC)
530
PARAMETER SELECTING SECTION
532
IMAGE PROCESSING SECTION
540
PRINTING CONTROL SECTION
TO PRINT ENGINE
PRINTING PROGRAM 50

[FIG. 8]


PRINTING PARAMETER
(HISTORY)
ERROR DETECTION/
CORRECTION CODES

[FIG. 9]

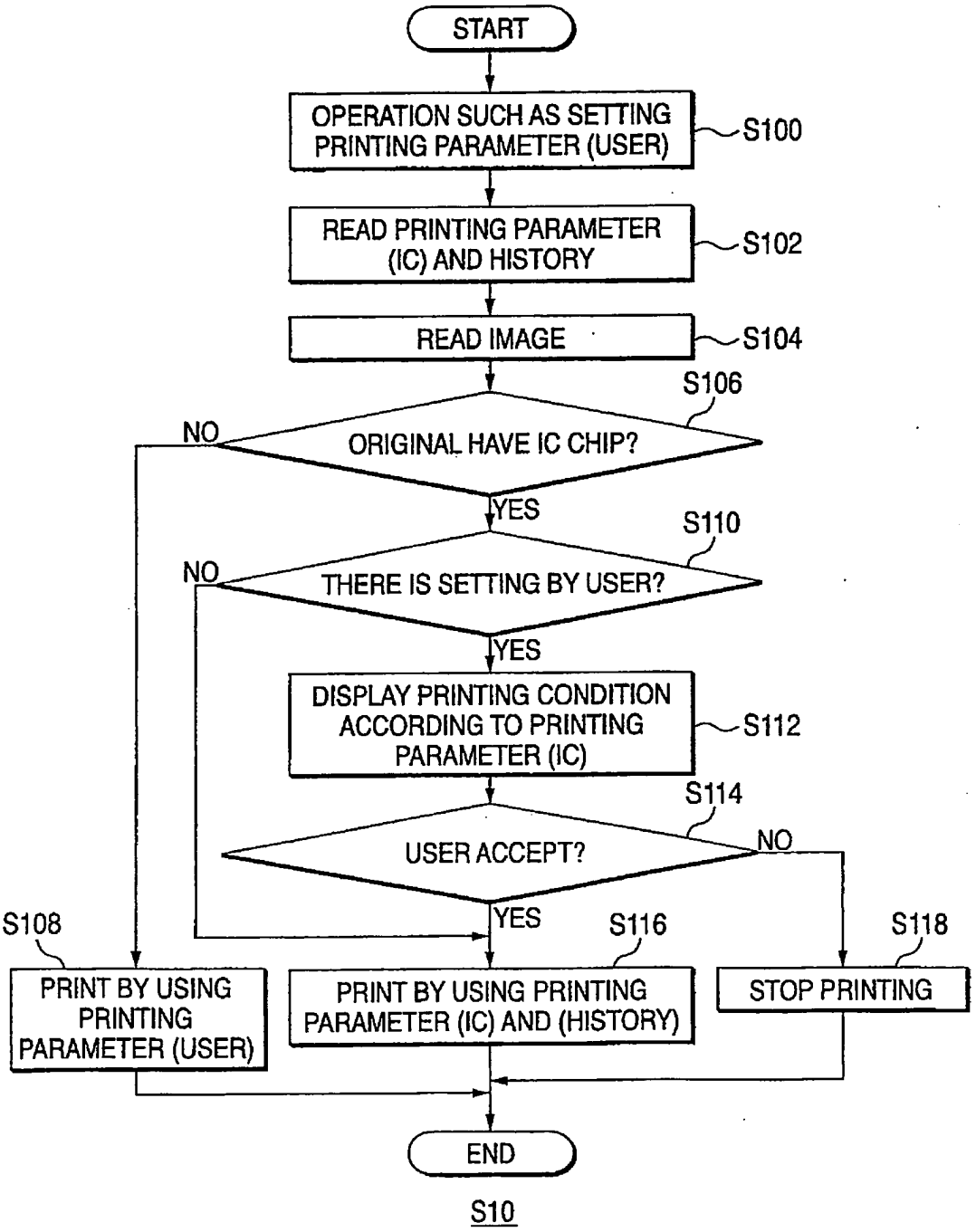
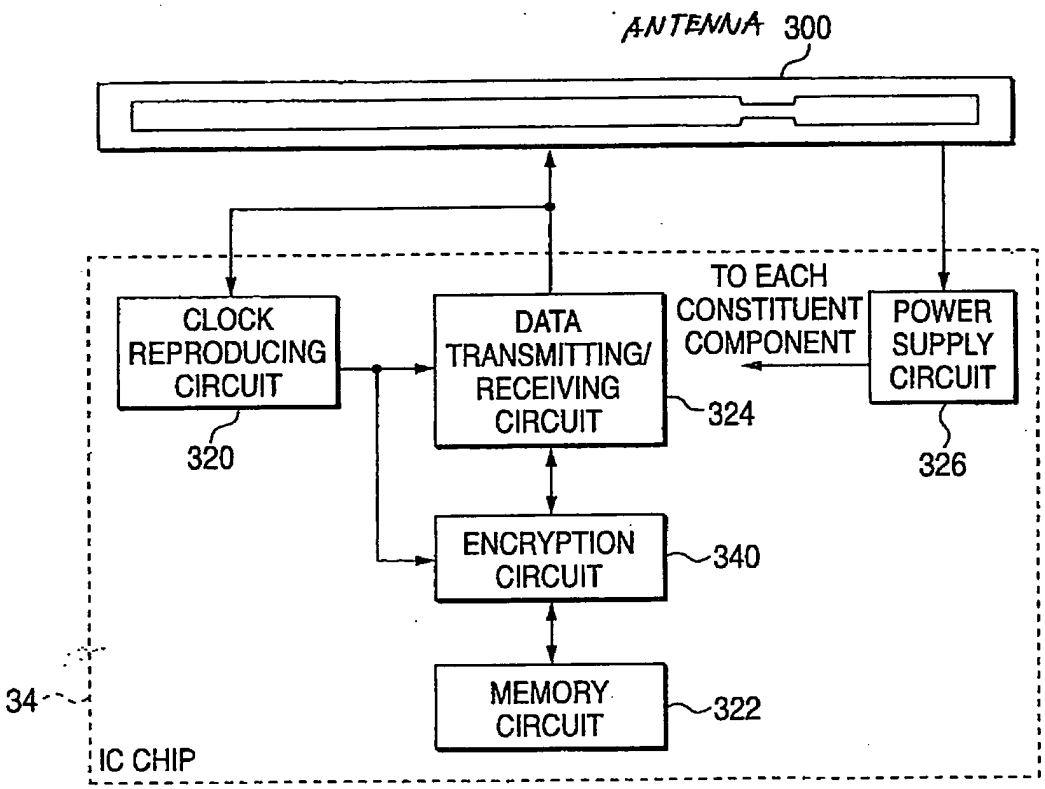

START
OPERATION SUCH AS SETTING PRINTING PARAMETER (USER)
S100
READ PRINTING PARAMETER (IC) AND HISTORY
S102
READ IMAGE
S104
S106
ORIGINAL HAVE IC CHIP?
NO
YES
S110
THERE IS SETTING BY USER?
NO
YES
DISPLAY PRINTING CONDITION ACCORDING TO PRINTING PARAMETER (IC)
S112
S114
USER ACCEPT?
NO
YES
S108
PRINT BY USING PRINTING PARAMETER (USER)
S116
PRINT BY USING PRINTING PARAMETER (IC) AND (HISTORY)
S118
STOP PRINTING
END
S10

FIG. 10


ANTENNA 300
CLOCK REPRODUCING CIRCUIT
320
DATA TRANSMITTING/ RECEIVING CIRCUIT
324
TO EACH CONSTITUENT COMPONENT
POWER SUPPLY CIRCUIT
326
ENCRYPTION CIRCUIT
340
MEMORY CIRCUIT
322
34
IC CHIP

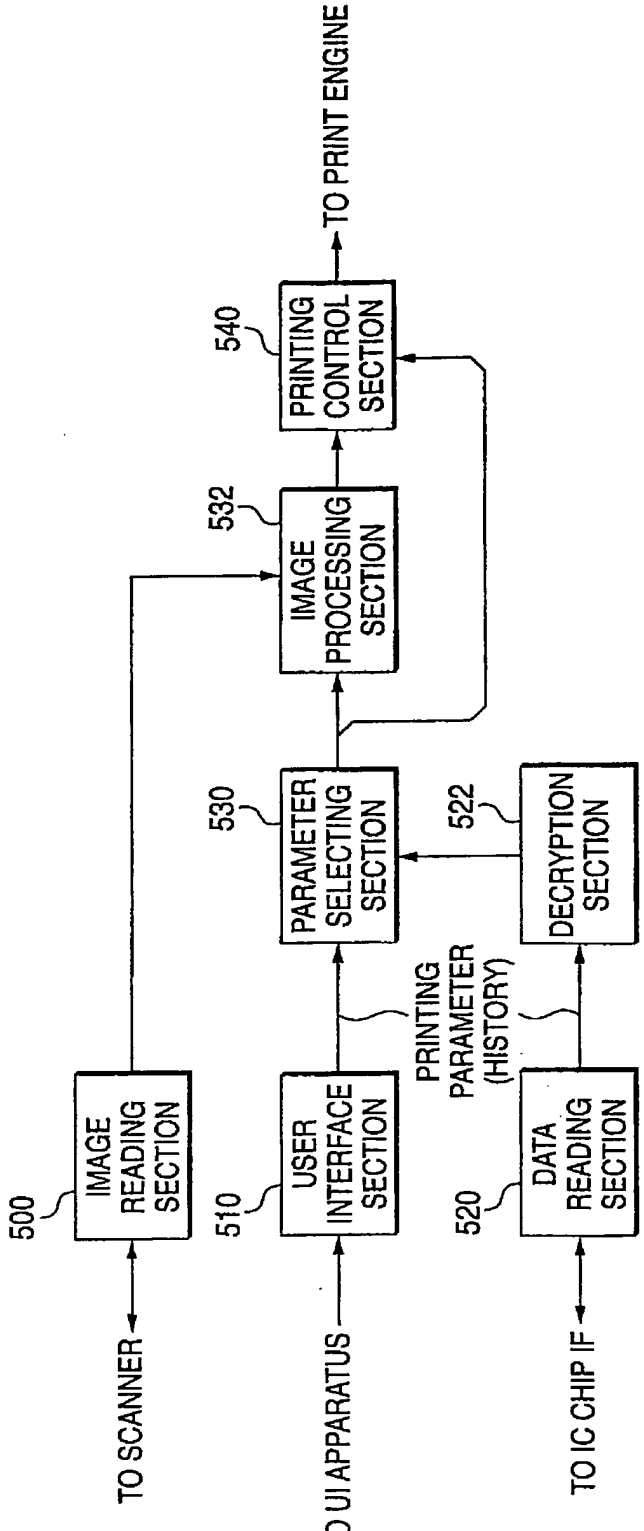


FIG. 11

PRINTING PROGRAM 62

[Fig. 12]

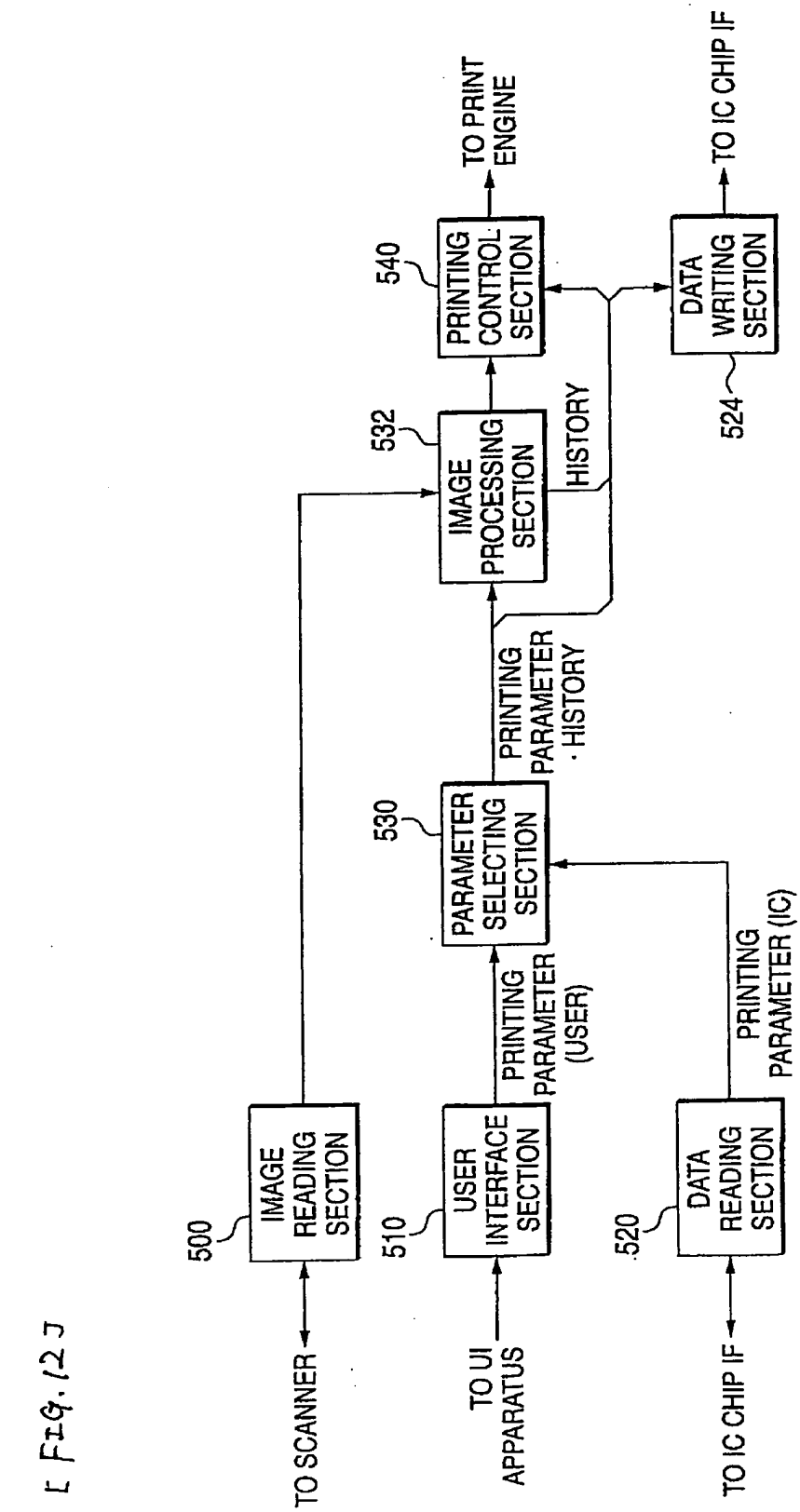
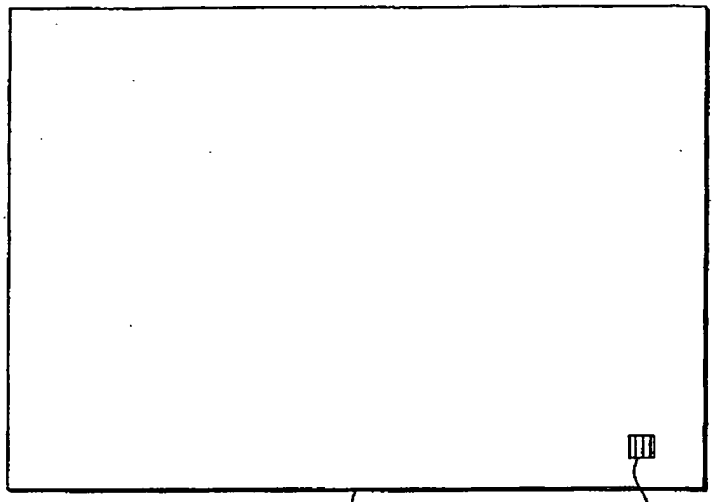

TO SCANNER
TO UI APPARATUS
TO IC CHIP IF
500
IMAGE READING SECTION
510
USER INTERFACE SECTION
520
DATA READING SECTION
530
PARAMETER SELECTING SECTION
PRINTING PARAMETER (USER)
PRINTING PARAMETER (IC) · HISTORY
PRINTING PARAMETER · HISTORY
532
IMAGE PROCESSING SECTION
HISTORY
540
PRINTING CONTROL SECTION
524
DATA WRITING SECTION
TO PRINT ENGINE
TO IC CHIP IF
PRINTING PROGRAM 54

FIG. 13

(A)


PRINTING PAPER 42
IC CHIP 3

(B)

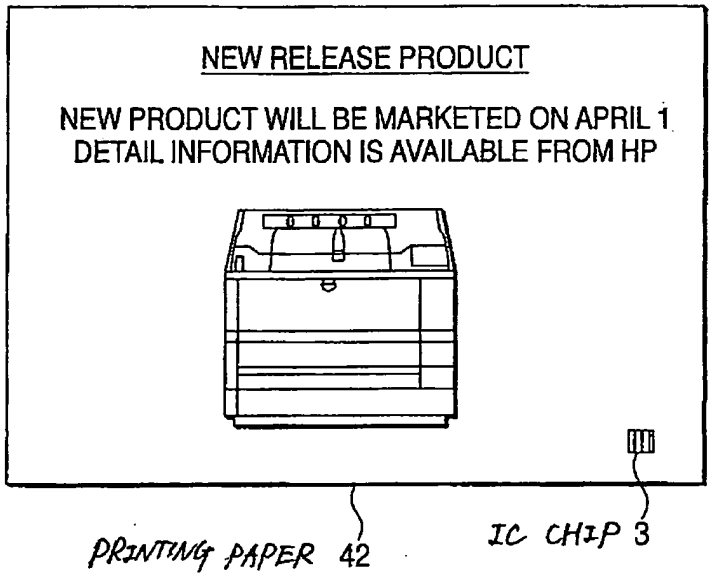
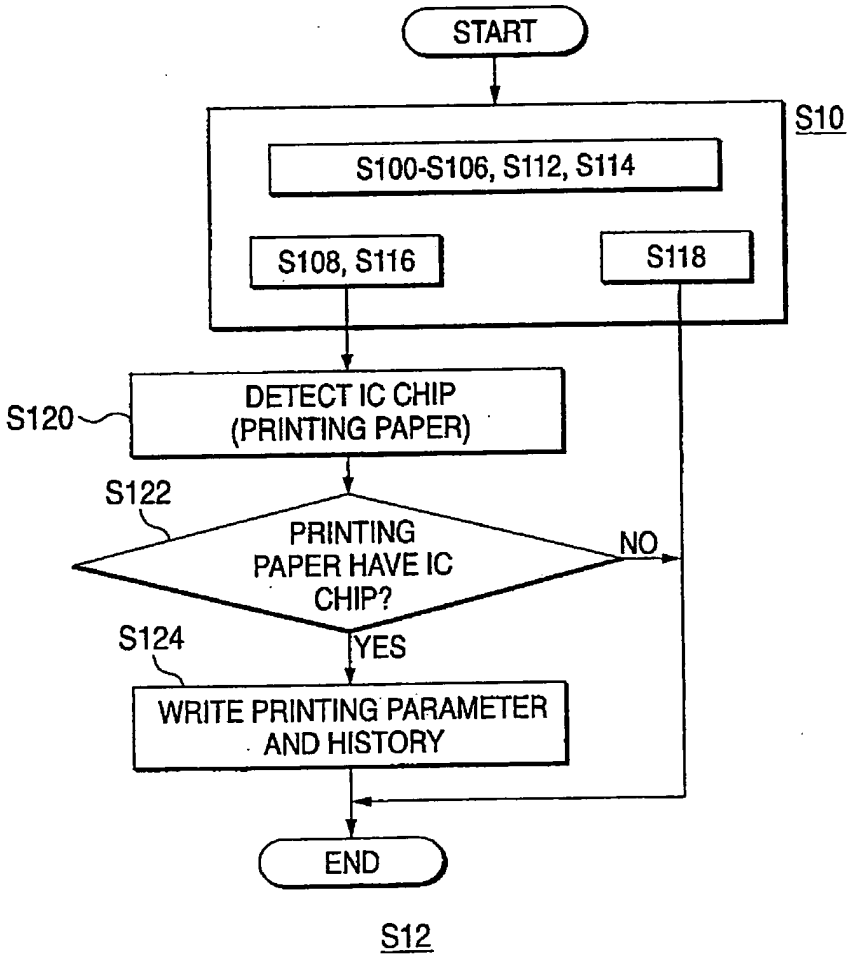

NEW RELEASE PRODUCT
NEW PRODUCT WILL BE MARKETED ON APRIL 1
DETAIL INFORMATION IS AVAILABLE FROM HP
PRINTING PAPER 42
IC CHIP 3

FIG. 14


START
S10
S100-S106, S112, S114
S108, S116
S118
S120
DETECT IC CHIP (PRINTING PAPER)
S122
PRINTING PAPER HAVE IC CHIP?
NO
YES
S124
WRITE PRINTING PARAMETER AND HISTORY
END
S12

[Name of Document] ABSTRACT

[Abstract]

[Purpose]

While setting information as to image forming operation is stored into an original document by utilizing a semiconductor chip from which data stored thereinto can be read out in a non-contact manner, the stored setting information is employed so as to form an image of the original document.

[Solving means]

An UI section 510 accepts a printing parameter set by a user. A data reading section 520 reads out a printing parameter from an original paper. An image reading section 500 reads out an image from the original paper. In the case that an IC chip has been attached to the original paper, a parameter selecting section 530 selects a printing parameter thereof, whereas in other cases, the parameter selecting section 530 selects such a printing parameter which is set by the user. Both an image processing section 532 and a printing control section 540 execute both an image processing operation and a printing operation in accordance with the selected printing parameter.

[Selected drawing]

Figure 7